Effects of the Private-Label Invasion in Food Industries

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How do name brand firms respond to increased competition from private-label firms? We find that much of the received wisdom about this response from the industry is not true.

In recent years, newspaper reporters, business executives, government officials, and others have been describing a fundamental change in food and beverage markets. They tell of an invasion of private-label products and of dramatic responses by name-brand firms. Strangely, academics have largely ignored these events.

We start by summarizing the views expressed in statements by industry experts into two sets of stylized "facts" about these markets. Then we empirically examine whether these stylized facts are true.

The stylized facts are:

(1) Since the early 1990s, private-label products have "invaded" the turf of name-brand food processing and beverage manufacturers.

(A) Private-label brands have lower prices than name-brands.

(B) Second-tier national brands were particularly harmed by this invasion.

(2) Name-brand firms defended their brands against the private-label invasion by

(A) increasingly differentiating their products,

(B) conducting sales,

(C) engaging in other promotional activities, and

(D) lowering their prices.

Thus according to this industry view, the invasion of private labels has resulted in greater competition through lower private-label, name-brand, and overall prices, and more promotional activity.

Although many of these claims may have been accurate in the early 1990s, they no longer are true for some or all food and beverage categories. Most importantly, we find that name-brand firms *increase* their prices and *decrease* their promotional activities when private labels enter.

Stylized Facts

By searching Lexis-Nexis files of newspaper articles and trade journals, we identified the received wisdom from the food and beverage industries that we summarized in our stylized "facts". We now repeat these claims as though they were facts. However, later in the paper, we show that many of these claims — even if they were true at the time the statements were made — are not true today.

Our first set of stylized facts say that the food industries have been in turmoil due to a rapid, sizeable growth of market share by private labels, which came out of the hide of name-brand firms, particularly the second-tier firms. The next set of stylized facts describe how the name-brand firms respond to increased private-label entry through greater product differentiation, lower prices, and more promotional activities.

Private-Label Invasion

Discount brands were introduced in American supermarkets in the late 1970s.[1] Consumers long regarded such a product as "a cheap and nasty generic substitute for the real thing, rolled out by retailers during recessions and discarded once the economy picked up again. But no longer is that so."[2] Starting in the late 1980s and early 1990s, high-quality private-label products were introduced. "Ten years ago, private-label brands were offered as a product of last resort," Brian Sharoff, president of the Private Label Manufacturers Association (PLMA) said in 1992. "Today, all major store chains have their own brands, and in category after category, they're every bit the quality of national brands."[3]

Some industry experts concluded that the recession in the early 1990s spurred private-label growth by undermining loyalty to leading brands in categories such as cigarettes, cereals, and disposable diapers.[4] For example, supermarket sales of private-label cigarettes jumped 95% in 1992 over the previous year. In the past, consumers switched back to their usual brands from generics after the recession ended. This time, having discovered that private-label products provided good quality, they continued to buy them.

A Gallup Poll commissioned by the PLMA reported that consumers' store brand awareness rose from 86% in 1991 to 91% in 1995, and the percentage of consumers who

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[1] Michael Janofsky, "Discount Brands Flex Their Muscles," *New York Times*, April 24, 1993: Section 1, p. 37.

[2] "Make It Your Own," *The Economist*, March 4, 1995, p. 8.

[3] Gary Strauss, "Battle of the Brands," *USA Today*, January 7, 1993, p. 1B.

[4] Gary Strauss, "Battle of the Brands," *USA Today*, January 7, 1993, p. 1B.

regularly bought private-label brands increased from 77% to 83%.[5] Of consumers surveyed, 76% agreed that store brands were "brands just like national brands." Of consumers who had bought premium private-label items, 90% rated the products equal to or better than national brands and planned to buy private-label products in the future.[6]

Private-label goods quickly gained substantial market shares and maintained high rates of growth. Private-label goods' share by volume of total supermarket sales of packaged groceries increased from 15.3% in 1988, to 19.7% by volume in 1993, and 20.2% in 1996.[7] (During this same period, the share of generic goods was small and declining.)

Supermarkets started prominently displayed house brands while dropping second-tier national brands in many categories.[8] Said to be particularly hard hit were brands ranked third, fourth, or fifth. When Safeway revamped virtually its entire private-label line, it dropped 10 lesser-known brand names.[9]

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[5] "From Imitation to Innovation," Responsive Database Services, Inc., *Business and Industry*, Racher Press Inc., *MMR*, October 13, 1997, 14(20), p. 12.

[6] Krumrei, Doug, "Brand Ho! Bakery Industry Trends for 1996," *Bakery Production and Marketing*, May 15, 1996; and Palmer, Eric, "New Vigor in Bread," *Milling & Baking News*, December 5, 1995.

[7] "Make It Your Own," *The Economist*, March 4, 1995, p. 8. "From Imitation to Innovation," Responsive Database Services, Inc., *Business and Industry*, Racher Press Inc., *MMR*, October 13, 1997, 14(20), p. 12.

[8] Michael Janofsky, "Discount Brands Flex Their Muscles," *New York Times*, April 24, 1993: Section 1, p. 37.

[9] Jamie Beckett, "Grocers Revamp Brands: Food Chains Improve Look of Private Labels," *San Francisco Chronicle*, March 2, 1992: B1.

Why Private-Label Quality Improved

The substantial quality improvement of private labels resulted from technological advances and production by name-brand firms. Technological advances allowed competitors to "come close" to replicating successful national brands.[10] Some national brands started producing private-label versions of their name-brand products, often to employ the excess capacity in their plants. Examples include Campbell Soup Company (Vlasic pickles), the American Safety Razor Company, Union Carbide (garbage bags), Hershey Foods (Ronzoni pasta), and Del Monte (canned fruits and vegetables).[11] Other name-brand firms produced private-label brands in different categories from their own: H.J. Heinz Company, the leading producer of ketchup, makes about 80% of the private-label soups sold in supermarkets.[12]

Why Supermarkets Switched to Private Labels

Grocery stores increased their use of private-label brands copying their successful use by discount and drug stores, and grocery stores found that their profits rose due to higher profit margins and greater store loyalty by their customers. In 1988, Wal-Mart (soon followed by other major discounters) entered food retailing and relied heavily on private-label products to undercut supermarket prices. The discounters' success — which threatened

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[10] Tony Kennedy, "Panel Discusses Threats to Brand-Name Foods by Lower-Priced Private Labels," Minneapolis *Star Tribune*, March 26, 1992:7D.

[11] Michael Janofsky, "Discount Brands Flex Their Muscles," *New York Times*, April 24, 1993: Section 1, p. 37; Jamie Beckett, "Grocers Revamp Brands: Food Chains Improve Look of Private Labels," *San Francisco Chronicle*, March 2, 1992: B1.

[12] *Ibid*.

traditional supermarkets — induced many supermarkets to follow their lead.[13] A few years later, drug stores started selling large quantities of private-label products: By the end of 1998, private-label products in drug stores account for 45% of dollar sales of ice cream, 31% of seasonings and spices, and 28% of nuts.[14]

Supermarket chains learned that private labels provided higher profits than national brands. According to Jonathan Ziegler, a retail-industry analyst at Sutro & Co., the gross margins on store brands may be 35% or more, versus an average of 25% on other products.[15] J. Sainsbury, the U.K.'s second-largest supermarket chain, boasts that its profit margins are more than triple those of the typical U.S. chain because it derives half of its grocery sales from its own brands.[16]

Supermarket profits also rise from carrying private-label brands because they create loyalty to a particular supermarket chain rather than to a national brand. Customers return to Safeway if they prefer the chain's Select brands.

Other Countries

This expanded role for private-label products is not restricted to the United States. In supermarkets in Europe and Canada, store brands play an even larger role than in the United States. Private-label ("own label") products have long been popular and very profitable in

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[13] "Make It Your Own," *The Economist*, March 4, 1995, p. 8.

[14] According to ACNielsen data: "Big Gains Seen in Two Channels," Responsive Database Services, Inc., Racher Press Inc., 17(2), November 15, 1999:46.

[15] Jamie Beckett, "Grocers Revamp Brands: Food Chains Improve Look of Private Labels," *San Francisco Chronicle*, March 2, 1992: B1.

[16] *Ibid*.

Britain, and are becoming increasingly popular in Europe according to a European-wide survey of 5,000 shoppers conducted by Mori for the Private Label Manufacturers' Association.[17] In Britain, consumers under 25 years old drove the growth in own label sales, and with 38% saying that they were buying more own label goods than in the previous year, over half said 40% of their purchases were own label products (whereas only 20% of consumers over 50 bought that large a share).[18]

Response of Name-Brand Firms to Private-Label Entry

Trade journals and newspaper articles report many round-table discussions by industry executives in which they bemoan the invasion of private-label products and discussed how they are responding. In addition to adjusting their pricing, these executives say that they engage in brand building (Nijssen and Van Trijp, 1998) by increasingly differentiating their products, conducting sales, or engaging in other promotional activities. For example, when consumers started switching from Kellogg's cereals to private-label cereals varieties similar to popular Kellogg's brands (that sell at roughly half the price), Kellogg announced that it was further diversifying its products, improving its advertising, and issuing more coupons to make its prices more competitive with generic brands.[19]

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[17] "Boost for Own Label," *The Grocer*, October 30, 1999, NEWS; Pg. 4

[18] *Ibid*.

[19] Andrew MacDonald, "Snap! Crackle! Ffffffft!: Consumer Revolution Takes the Pop! Out of Breakfast Giant," *The Ottawa Citizen*, December 3, 1998: Business, p. D1.

Differentiation

Brands are maintained through differentiation. Food and beverage firms constantly innovate to keep up with changing consumer tastes. For example, in recent years, firms have introduced many low-fat and no-fat products after consumers became concerned about health warnings about dietary fat. One might think of this approach constantly providing new products as a flagpole strategy: "Let's run it up the flagpole and see who salutes it." Products that are not accepted by consumers are quickly dropped.

Quaker Oats' CEO Robert S. Morrison said that "Innovation is the lifeblood of profitable growth. Leading brands possess great long-term value only if they can evolve over time to respond to the tastes and needs of new generations."[20] "Innovation is critical to our growth agenda," noted Dale F. Morrison, president and CEO of Campbell Soup. "We are making our brands more contemporary, more relevant and more convenient to consumers of all ages."[21] Campbell Soup produced new soup varieties and packaging formats such as its Campbell's ready-to-serve tomato soup in resealable plastic containers and Campbell's Soup To Go in microwaveable single-serve bowls.

Many managers reported that they increased the rate at which they innovate in response to the challenge of private labels.[22] For example, firms introduced 16,143 prod-

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[20] Kathryn Martin and Kiyoko Kubomura, "Top 100 Food Companies Worldwide," *Food Engineering*, December, 1999, p. 26.

[21] *Ibid*.

[22] The number of new supermarket and drugstore items went from a mere 1,281 in 1964 to 20,076 in 1994, though many of these innovations presumably would have occurred in the absence of private-label competition. "Quantum Leap," *Investor's Business Daily*, Executive Update CEO Briefing, January 20, 1995: A3.

ucts in 1991, including 12,398 food products and 3,745 non-food products such as diapers and shampoo, which was 22% more than they introduced the previous year.[23] Fred C. Meendsen, a vice president at CPC International, the food products company, told analysts that a combination of sensible pricing and innovation with a strong brand name "can stabilize your market share."[24]

In recent years, an average 27% of General Mills' volume has come from products five years old or less.[25] "Our fiscal 2000 plans call for higher levels of new product innovation across our U.S. businesses," reports Stephen Sanger, chairman and CEO of General Mills. To accelerate the flow of innovative and creative products, General Mills' operating divisions now focus at least 25% of total resources on new products and new business ideas. The company has recently introduced Yoplait Go-Gurt, a portable yogurt snack in a flexible squeeze tube that is ready to eat refrigerated or frozen; and Sunrise certified organic cereal.

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[23] Tony Kennedy, "Panel Discusses Threats to Brand-Name Foods by Lower-Priced Private Labels," Minneapolis *Star Tribune*, March 26, 1992:7D.

[24] Michael Janofsky, "Discount Brands Flex Their Muscles," *New York Times*, April 24, 1993: Section 1, p. 37. He cited CPC International products as examples of innovation, such as a new Hellmann's mayonnaise with reduced fat content, a new Mazola oil with canola oil replacing some corn oil to reduce saturated fat, Thomas's English muffins in sandwich size, and a new product, Homestyle Ranch salad mix, in which milk or sour cream can be added to make a salad dressing.

[25] Kathryn Martin and Kiyoko Kubomura, "Top 100 Food Companies Worldwide," *Food Engineering*, December, 1999, p. 26.

Promotional Activity

Name-brand manufacturers also increased point-of-purchase promotional activities in response to the new competition. The share of budgets allocated to sales promotion and advertising were 73% and 27% in 1992, compared to 62% and 38% in 1960, respectively.[26] From 1980 to 1992, U.S. food manufacturers' spending on promotional schemes, such as money-off offers and coupons, rose from half to three-quarters of total marketing budgets, while advertising's share fell from 44% to 25%.[27] Nelson and Hilke (1991) found that featuring by retailers can provide strategic advantages to a dominant coffee manufacturer in fending off a new entrant or smaller competitor that tries to expand.

Pricing

Many national brand executives reported that the private-label invasion was killing brand loyalty, so that they had to cut prices to compete. This reasoning was given by Philip Morris when cut its price for Marlboro cigarettes, Procter & Gamble when it reduced the price of Pampers diapers by a quarter, and Kraft General Foods when it lowered its cheese prices by 8%.[28]

Data

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[26] Pat Natschke Lenius, "POP Is Cited as Catalyst for Growth," *BrandMarketing Supplement to Supermarket News*, IV(6), June 2, 1997:12.

[27] Guy de Jonquieres and Nikki Tait, "A Trolley Full of Troubles," *Financial Times*, May 6, 1993: 17.

[28] Jamie Beckett, "Grocers Revamp Brands: Food Chains Improve Look of Private Labels," *San Francisco Chronicle*, March 2, 1992: B1. Guy de Jonquieres and Nikki Tait, "A Trolley Full of Troubles," *Financial Times*, May 6, 1993: 17.

We use Information Resources Incorporated's (IRI) InfoScan™ data. IRI obtains data on all items scanned at cash registers from 11,300 local grocery stores from across the United States. The data are then scaled up to reflect all the sales in stores with revenues of $2 million and greater.

The InfoScan database contains information on dollar sales and physical volumes of food products at the brand and UPC (universal product code) or item level. The database also contains the share of dollar sales and physical volume sold on promotion (price reduction, special display, retail ads, and any other type of promotion excluding coupons).

For major chains, IRI gets a *census*: complete information from all of the chain's stores. IRI obtains between 90% and 92% of its scanner information in this way. As these data are already complete, no scale adjustment is required to convert this information to national levels. Random stratified sampling is used for the remaining (primarily nonchain) stores. A rotating panel design (similar to government surveys) is used where a fraction of the stores are dropped from the panel each month and replaced by others. Information about the entry and exit of stores is obtained from the census and random stratified sampling information and from field personnel. The random stratified sampling data are then projected to national levels.

The individual *item* data we use were drawn from the U.S. Department of Agriculture's Economic Research Service's version of the InfoScan database, which contains 519

different product *types*, which are in turn subsets of 166 product *categories* from 5 major supermarket *departments* (edible groceries, frozen food, bakery, dairy, and deli).[29]

We randomly selected 34 categories — a little over one-fifth of the available categories. Of these, we dropped two, baby food, which had no private-label or generic purchases during the relevant period, and wine, which had only a trivial amount (0.3%).

Although the data set contains information on each individual branded item sold, it reports only aggregated data for generic items and for private-label items per time period. Thus, we do not know how many private-label items or firms there were, but we do know the average price and quantity sold.

Local promotion information is collected by IRI field auditors on a weekly basis and used to develop physical and sales volume measures of food products sold under promotion and merchandising. The auditors track and classify the use of displays, retail ads, and any other retailer merchandising efforts. Promotion information is assembled each week and merged with weekly scanner data. The information allows IRI to differentiate regular everyday sales from sales made under promotion or special merchandising. The Economic Research Service database provides 10 promotion measures (5 for dollar sales and 5 for physical volume), which reflect the share of sales and physical volume sold under price reduction, display, feature, feature and display, and any individual or combined use of these promotions. Price reduction refers to items with temporary sale prices; display, to aisle or

[29] IRI's complete InfoScan database contains data from 8 major supermarket departments, 266 product categories, and more than 800 product types.

end displays; feature, to items that are primarily advertised in local papers or paper inserts; feature and display, to items that are both advertised and on display.

The data set covers a little over two years. The sample is divided into 29 time periods of four weeks each, which we call *months* (though we should call them "februaries"). Thus, there are 13 IRI months per year. The first month in the sample ended on December 8, 1996, and the last one on January 31, 1999.

Evidence on the Private-Label Invasion

Are the food industries' stylized "facts" correct? We start by asking whether the "invasion" of private-label products has continued in recent periods, whether private-label products sell for less than name-brand goods, and whether market share gains by private labels have come at the expense of second-tier national brands.

Share of Private-Label Goods

Food and beverage industries differ substantially in the degree of penetration of private-label and generic goods and the growth rate of their share. Averaging over all 32 of our categories (and weighting each category equally), the revenue share of private-label and generic items is 14.3% and the quantity share is 19.0%. As Table 1 shows, private-label and generic goods are nearly two-thirds of the quantity share of frozen fruit, but only 1% of pickles and relish. Generics' share was 0.6% of hot cereal sales, 0.5% of shortening and oil, and 0.3% or less for all other categories. Moreover, no generics were sold in roughly half of the categories. Henceforth, we treat both private label and generics as one group, which we (inaccurately) call *private-label* goods.

To determine whether the rate at which the share of private-label goods increased over our time period, we regressed the logarithm of their share on a time trend and monthly seasonal dummies.[30] The last column of Table 1 reports the estimated annual exponential growth rates. In about half of our categories, there was no substantial change in the share of private-label goods. In only two, English muffins and ice cream, did we find a statistically significant (at the 0.05 level) decreasing rate.[31] Private-label goods penetration increased at a statistically significant rate in the remaining 40% of the categories. Double-digit growth rates occurred in slightly more than one-quarter of the categories, which are categories with typically small private-label good shares. Thus, our first conclusion is

- *Private-label and generic goods continue to "invade" fewer than half of food and beverages categories, but their share is growing rapidly in one in four categories.*

Pricing

According to the prevailing belief, private-label goods cost less than do branded goods, so the overall average price in the market place should lie in between that of private-label and name-brand goods. The first six columns of Table 2 show the levels and growth rates of the real prices for all items, branded items, and private-label items (where the

[30] Because there are 13 "months" in a year in our data set, we use a time trend of 1/13, 2/13, 3/13...

[31] Though the tables note whether we can reject the hypothesis that a coefficient differs from zero at both the 0.10 and 0.05 levels, we use the 0.05 level as our criterion in the following discussion. We also adopt the sloppy habit of saying that a coefficient is "statistically significant" to mean that we reject the null hypothesis at the 0.05 level.

nominal prices are net of any coupon discount and are deflated by the overall Consumer Price Index, which has been normalized to equal one in the first period). The last two columns show the private label and overall prices as a percentage of the branded price.

The private-label price is less than the price for branded goods, so that the average price for all goods lies in between, in all categories except frozen poultry where the private-label prices are substantially higher than those of name-brand goods. Frozen poultry has the largest share — nearly two-thirds of industry quantity — of any category.

- *In virtually every category, private-label prices are lower than those of name-brand goods.*

Shares of Individual Name-Brand Firms

When the quantity share of the private-label items grow, the quantity share of branded goods must fall collectively, but not necessarily for any individual firm. Before examining whose ox is gored by private-label entry, we describe the structure of the name-brand firms' part of the market.

Table 3 shows the average over the period of the quantity shares of the largest branded firms, where the ranking is determined in the first period of the sample. The first four columns show the shares for the first through fourth largest firms. The next column shows the combined shares of firms 5 through 8. The following two columns list the average shares of the smaller name-brand firms and of the private-label firms. The last two columns show the annual exponential growth rates of the two largest firms.

The largest four firms have the lion's share of the market in virtually all these industries. The share of the largest firm ranges from 9.6% in frozen fruit (where private-label goods control two-thirds of the market) to 78.2% in pickles and relish.

We can examine the overall equality of shares of only the name-brand firms using Gini indexes. The Gini index takes on a value of one when one firms controls the market and a value of zero when the shares are equally distributed. As Table 4 shows, the Gini indexes for name-brand items and for name-brand firms are close to one for most industries. The item Gini ranges from .64 for frosting to .96 for mustard and ketchup. The firm Gini ranges from .81 for canned hams and frozen fruit to .98 in spaghetti and Italian sauce. The firm Gini is greater than the item Gini in each category.

The table also reports the annual growth rates for these two Gini indexes. Most, but not all of the item Gini trends are downward toward greater equality of shares; however, about the same number of categories have firm Gini indexes that are rising as are falling and many industries show no trend at all.

- *The distribution of the shares of name-brand firms is highly skewed, and the shares are not growing more equal over time in most industries.*

To examine how private label entry affects individual name-brand firms and the equality of their quantity shares, we regress the logarithm of individual firm shares and the logarithm of Gini indexes on the logarithm of the private-label quantity share, and three seasonal dummies (spring, summer, fall) adjusting for first-order autocorrelation. (We use this same right-hand side variables and estimation technique in all our private-label share regressions.)

Because of the log-log specification, the estimated coefficients on the private-label share is an elasticity. Table 5 reports the elasticities of the shares of individual name-brand firms on the private-label share. These estimates are unconstrained (we cannot easily impose an adding up restriction given the log-log specification).

Contrary to our stylized "fact", the private-label invasion tends to reduce sales of the leading firm (though gelatin mixes, pickles and relish, and pizza products are exceptions). In half the categories, an increase in private-label share statistically significantly reduces the share of the largest firm. For example, a 1% increase in private-label share reduces the leading ice cream firm's share by over 2%. In four categories, we find a statistically significant increase in the first firm's share.

An increase in private-label share leaves the shares of most of the other big-eight firms relatively unchanged. Of those that change, more gain share than lose it. Only in four categories did the second firm have a larger statistically significant negative elasticity than the largest firm. In only four categories for the second largest firm, five categories for the third largest firm, four for the fourth largest, four for the fifth through eighth largest, and three for the smaller name-brand firms was the drop in market share statistically significant and larger than for the biggest firm.

Thus, although several newspaper articles suggested that the private labels particularly harmed the third, fourth, fifth, and smaller name-brand firms, our empirical results suggest that the leading firm was relatively harmed in many categories. Gelatin and frozen fruit are the clearest examples where the third and fourth largest firms were big losers.

The smaller name-brand firms (other than the big eight) are typically not affected or are more likely to grow than shrink. Perhaps consumers' willingness to experiment with new products aids both private labels and some minor name-brand items.

Another way to look at the impact of private-label penetration on the relative shares of name-brand firms is to use a Gini index. Table 6 shows the effect of private-label penetration on the item Gini of item shares and the firm Gini. Here, the results are unambiguous. Private-label penetration either has no effect or lowers the Gini indexes. That is, increased competition from private labels tends to (slightly) increase equality of item quantity shares and name-brand firm quantity shares.

- *Increased private-label share tends to relatively harm the leading name-brand firm and leads to slightly more equal name-brand item and firm shares overall.*

Evidence on Name-Brand Responses

Are stylized "facts" about the reaction of name-brand firms to increased private-label competition correct? In particular, did name-brand firms defended their brands against the private-label invasion by increasingly differentiating their products, conducting sales, engaging in other promotional activities, and lowering their prices?

Differentiation

As we lack information about the detailed characteristics and qualities of the gigantic number of items produced, we cannot directly look at the degree of differentiation. Instead, we use the number of items, the number of births and deaths of items, and the ratio of items to firms as proxies for the attempts by name-brand firms to differentiate their products.

Branded Items and Firms

What has happened to the number of name-brand items and firms? Have the private-label goods driven some name-brand firms and items out of business? Or, have name-brand firms — attempting to further differentiate their products — increased the number of items they sell?

The number of branded items, brands, and name-brand firms varies substantial across categories, as Table 7 shows. In a typical month, the canned ham industry had an average of 30 firms, 41 brands, and 86 items, whereas the ice cream industry had more than 11 times as many firms (342), more than 15 times as many brands (626), and nearly 85 times as many items (7,294).

Table 7 shows the annual growth rates of items, brands, and firms and, for comparison, the growth rate for all quantity (branded and private label). Unlike at the beginning of the 1990s, the number of branded items and firms is falling in the majority of categories. The number of items and firms are more likely to be increasing in categories where total quantity is growing, however, the relationship between quantity growth and growth in the number of items or firms is not a strong one. Counterexamples include ready-to-drink tea products, where quantity grew at 13.2% per year, yet the number of branded firms selling these products fell by 8.3% per year and the number of branded items dropped at a 7.9% rate.

- *In recent years, the number of branded items and firms decreased in most categories.*

Items Per Firm

Did differentiation by name-brand firms increase? Although we cannot directly look at reformulations or shifts in quality, we can examine whether the number of name-brand items per firm (next to last column of Table 8) increased. The number of items per name-brand firm is falling at a statistically significant rate in 13 categories and growing in only 8. The last column of Table 8 shows the growth rate of the ratio of name-brand items to all quantity sold (measured in hundred thousand units). The number of items per quantity is falling at a statistically significant rate in 9 categories and growing in 6.

- *The number of name-brand items per name-brand firm or per quantity sold is increasing in only a minority of categories.*

We can directly examine whether the number of items per firm falls as private-label penetration increases. Table 9 shows that differentiation — as measured by items per firm — does not increase with private-label competition, contrary to our stylized "fact". There is a statistically significant elasticity of the items per firm with respect to private-label share in only 7 categories. Of these, only one elasticity is positive.

- *When the private-label share increases, the number of name-brand items per firm — a measure of differentiation — is unchanged of falls.*

Of course, it is still possible that name-brand firms increasingly modify their products' characteristics or raise quality of existing products.

Births and Deaths

Another indicator of differentiation by firms is the rate at which they create new products (and kill off old ones). Table 10 shows the number of births and deaths of items per

firm. The average number of births and deaths per firm are roughly equal in most categories, which is consistent with relative small rates of increase or decrease in the number of items per firm over time. This observation is consistent with the flagpole theory in which firms are constantly creating new items and removing old items to try to stay abreast of changing consumer tastes.

Although births and deaths roughly cancel each other over time, they do not tend to occur simultaneously. As Table 10 demonstrates, the correlation between births and deaths of items is small in almost all categories (except frosting, where the correlation is .49). The correlation between births and deaths of firms is sometimes moderately large (.46 for cottage cheese and -.47 for gelatin mixes), though more often negative than positive.

- *The average rates of births and deaths of items are roughly equal over time, but the timing of these events is relatively uncorrelated.*

The first two columns of Table 11 show that the quantity share of new and deceased products out of all branded items is relatively small. (The share of births is from the current period and the share of deceased good is from the previous period). One might expect that firms would choose to eliminate unsuccessful products with small shares. Given that there are roughly an equal number of births and deaths, that suggests that the collective share of births would be larger than those of deceased goods. In only a few sectors is the share of births substantially larger than that of cancelled products. For example, the share of new canned ham items and new frozen poultry items are roughly twice that of deceased items. In most sectors, the shares of the births and the deaths are roughly equal.

The last two columns of Table 11 show how the price of new and eliminated items compare to those of continuing items. We might expect that the prices of both new and eliminated items would be lower than the prices of other items. New products might have low introductory prices. Before eliminating an unsuccessful product, a firm might try lowering its price. However, the table illustrates that the prices of both new and eliminated items are roughly equal and are usually fairly close to the prices of other goods (the price ratios in the table are roughly equal to one). One notable exception is popcorn and popcorn oil where the prices of new and eliminated items are only about two-thirds that of continuing items. Another interesting exception is mustard and ketchup where new (higher quality?) items typically cost twice as much as do existing products, and even eliminated items are 50% more expensive than continuing items.

Promotional Activities

According to our stylized "facts", name-brand firms engage in sales (price reductions) or nonprice promotions in response to the private-label invasion. Unfortunately, we do not have information about their national advertising, but we do know about local and in-store promotions — which are increasingly the dominant forms of promotion.

Name-brand firms frequently engage in promotional activities, as Table 12 illustrates. In a typical month, the share of name-brand items with temporary price reductions — sales — ranges from 5% in hot cereal to 18% in butter.

The nonprice promotional activities include local feature ads and in-store displays. The lowest share of items with nonprice promotions of merchandising is 4% for sugar substitutes and vinegar, but the share exceeds a third for canned ham, crackers, ice cream, and

ready-to-drink tea. The share of all merchandising — price and nonprice promotions combined — reaches nearly a half for canned ham and ice cream.

Table 12 also shows a pronounced downward trend in promotional activities. Except for refrigerated pizza and rice and popcorn cakes, the quantity share of items with price promotions is stable or declining. There is little change in the share of nonprice promotions, with statistically significant decreases in only four categories and increases in only four categories.

- *Both price and nonprice promotional activities by branded firms are common; however, the share of name-brand items with price promotions was for the most part stable or decreasing in recent years.*

Table 13 shows the elasticity of the share of price reductions and nonprice promotions with respect to the private-label share. Every statistically significant elasticity of price reductions with respect to private-label share is negative: Name-brand firms either make no change or have fewer sales. As private-labels expand, name-brand firms are substantially less likely to engage in nonprice promotions using feature ads and displays. Not only are virtually all the statistically significant elasticities negative (the pizza product category is the only exception), but most of these negative elasticities are larger than one in absolute value — in many cases much larger. For example, the elasticities for rice and popcorn cakes, yogurt, mustard and ketchup, and hot cereals are between -4 and -5, while the elasticity for butter is nearly -11. The statistically significant sales elasticities are also negative, though usually smaller in absolute value than the nonprice promotion elasticities. Thus, our findings repudiate the conventional wisdom:

- *Name-brand firms react to increased private-label competition by holding fewer sales and reducing the share of items with nonprice promotions.*

Prices

According to industry sources, the invasion of private-label products forced name-brand firms to lower their prices. However, we will show that the price actually rises. Before doing so, we summarize the relevant economic theory that explains why the name-brand prices could rise or fall.

Economic Theory

There are at least three theories that would explain why the price may rise: spatial model, higher quality, noisy monopoly (price discrimination). These theories could all simultaneously apply.

Spatial Model. We illustrate that entry may cause the price to rise using a single-dimension spatial model, such as Hotelling's (1929) linear model or Salop's (1979) circle model. Suppose that there is initially a single product in the market that sells its good at a monopoly price, p_m. Another firm introduces an item in product space z distance from the original good.

If the new item is located at the same point in characteristic space as the original one, $z = 0$, the two goods are perfect substitutes so that price falls if the firms act noncooperatively and remains constant if the firms collude. If the new product is located so far from the original one that no consumer is interested in buying both products, $z > \bar{z}$, entry does not affect the original item's price.

Now suppose that the two products are located near enough each other that they compete for the same customers but are not perfect substitutes: $0 < z < \bar{z}$. The original firm competes for the same customers as its rival if both set relatively low prices so that some customers would receive positive surplus from purchasing either item. Before entry, the monopoly kept its price down to attract consumers who are located relatively far from its product in characteristic space. Some of these distant customers now prefer the new product, which has characteristics closer to their ideal than does the original product. After entry, the original firm has less of an incentive to lower its price to attract consumers for whom its product is a relatively poor match, so it may raise its price and sells to only consumers located near its product in characteristic space whose demand is relatively inelastic.

Perloff, Seguin, and Suslow (1996) show that whether the price of an existing item rises or falls depends on how close the two products are located, as Figure 1 illustrates. If the items are located close together, $z < \bar{z}_b$, the symmetric Bertrand price, p_b, is below the monopoly price, $p_b < p_m$. The Bertrand price is greater than the monopoly price if $z_b < z < \bar{z}$. The firms set $p_b > p_m$ because the Bertrand duopolists face *less elastic* demands than did the monopoly. After entry, some consumers greatly prefer the new brand to the original one (and vice versa). Each firm finds it profitable to concentrate on selling to those consumers with relatively inelastic demands.

Even if the private-label goods are physically identical to existing brands, some consumers may prefer the existing products (brand loyalty) so that they view them as being located at different points in characteristic space. If so, the new items may take relatively

price-sensitive consumers from the name-brand items leaving only relatively price-insensitive customers. Consequently, the price of the name-brand products may rise.

If the firms collude, both firms operate at the same location, the best they can do is split the monopoly profit. If the products are differentiated ($z > 0$), the cartel price, p_c, must be *above* the original monopoly price, p_m, because the cartel is operating as a two-location monopoly. By adding a differentiated brand, the cartel has more customers who are willing to pay very high prices than before because more customers are located close to their ideal brand than with a single-location monopoly.

Higher Quality. Alternatively, name-brand products may raise the quality of the goods they produce when faced with private-label entry.[32] If it is more costly to produce higher quality goods, this response may lead to higher name-brand product prices.

Several industry executives report that they fight back by raising quality. General Mills Inc. Vice President John Hallberg, said that, because his company feared technological advances that have allowed competitors to "come close" to replicating successful brands, it focuses on product improvement: "In Big G (General Mills' cereal division), we have an objective to improve a third of our products every year."[33]

Noisy Monopoly. By intentionally increasing consumer uncertainty, a firm may be better able to exploit ignorant consumers and earn a higher profit (Salop 1977). One way that

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[32] Analogously, Allenby and Rossi (1991) report that consumers are more likely to switch up to high-quality brands than down in response to price promotions.

[33] Tony Kennedy, "Panel Discusses Threats to Brand-Name Foods by Lower-Priced Private Labels," Minneapolis *Star Tribune*, March 26, 1992:7D.

firms confuse consumers is to create *noise* by selling virtually the same product under various different brand names. As we noted above, some firms sell a product under their own brand name at a relatively high price and supply grocery or discount stores with a virtually identical private-label product that is sold at a lower price.

Brand proliferation pays if the cost of producing multiple brands is relatively low and the share of consumers who are willing to buy the higher-price product is relatively large. Otherwise, the firm makes a higher profit by selling a single product at a moderate price, rather than selling one brand at a low price and another at a high price.

Price of Individual Name-Brand Firms

We inspected the histogram for each brand price in each category. Generally, the distributions look logarithmic, with a single peak and a long right tail. Thus, we summarize these distributions by the first two moments of the log price.[34]

We start by examining the effect of private-label penetration on the pricing behavior of individual name-brand firms. Table 14 shows the results of the regressions of the log price of each of the eight largest firms and the average price of the other branded firms on the share of private-label goods and seasonal dummies. One reason that we control for seasonality in these regressions is MacDonald's (2000) finding that food prices tend to fall in periods in which demand peaks.

[34] Because we determined no clear patterns to the second moment in our regression analyses, we only briefly mention the results here. As the share of private-label goods rises, the variance of the price of branded goods does not change statistically significantly in 14 categories, falls in 6 categories, and rises in 12 categories.

We have a remarkable result. Despite the large number (288) of estimated coefficients every statistically significant coefficient is positive!

- *Increases in the share of private-label goods leads to a rise in the price of name-brand goods.*

This same phenomenon has been observed in the pharmaceutical market (see Caves, Whinston, and Hurwitz, 1991; Grabowski and Vernon, 1992; and Frank and Salkever, 1992, 1997). When manufacturers of generic pharmaceuticals are allowed to sell an exact clone of a previously proprietary drug, they sell at a price far below that of the original name-brand product. Although price-sensitive consumers switch to the generics, the brand-conscious consumers who continue to buy the name-brand drug are charged a higher price than they paid originally. Frank and Salkever (1997) report that the share of prescriptions sold by retail pharmacies that was accounted for by generic products roughly doubled during the 1980s. Using a sample of 32 drugs that lost patent production during the early to mid-1980s, they find that name-brand prices increased after generic entry and were accompanied by large decreases in the price of generic drugs.

Relative Prices

Does the overall market price rise or fall with increased private-label penetration? We answer this question in Table 15, which reports the regressions of the logs of average overall price, the average branded prices, and the average private-label price on the usual right-hand side variables.

We considered three possible theories about the effects of increased penetration on private-label prices:

(1) If the private-label goods are essential identical generic goods that are priced competitively at marginal cost, further entry of private-label good should have no effect on their price.

(2) If the private-label items are monopolistically competitive as described by a Chamberlinian model, where all goods compete with each other symmetrically (that is, not asymmetrically as they would in a spatial model), entry lowers the average price.

(3) If the private-label goods are effective branded (e.g., Safeway's well-regarded Select brand) and spatially differentiated from other branded goods, entry could raise or lower price.

We expected that either the first or second story (but not the third one) would apply in these food industries. The empirical evidence is consistent with the predictions from the first two stories (and not the third). In virtually every category, penetration has no statistically significant effect or a negative effect on the price of private-label goods. The only exceptions are frozen breakfast food and snack and granola bars.

We already know that penetration has either no statistically significant effect or raises the price of branded goods.[35] Although conventional industry wisdom predicts that the overall average price will fall with increased private-label penetration, the question remains whether it does so given the increase in name-brand prices. The overall price has a statistically significant negative elasticity in 10 categories (31%), a positive effect in 6 categories (19%), and is unchanged in the remaining ones. In all but one case where the overall elastici-

[35] However, the elasticity for aggregated name-branded crackers is -.12 in Table 15. Presumably this inconsistent result reflects the several negative (but statistically insignificant) elasticities for the individual firms in Table 14.

ty is positive, the name-brand elasticity is an even larger positive number. Whether the overall price rises in some because of private-label penetration or whether other unmeasured effects (e.g., increases in costs) are responsible remains an open question.

- *An increase in private-label share is correlated with either no effect or a decrease in the price of private-label goods, no effect or an increase in the price of branded goods, and usually but not always no effect or a negative effect on the overall price.*

Sensitivity Experiments

Are these regressions reasonable? The two obvious criticisms of them are that they neglect other relevant factors and that the share of private-label goods may be an endogenous variable. We experimented with including various combinations of the logs of the following variables as additional regressors: Gini index for items, Gini index for firms, number of name-brand firms, fraction of births and deaths, shares of the four largest name-brand firms, and the share of the name-brand firms other than the eight largest ones. None of these "structure-conduct-performance" variables substantially changed our qualitative results for the coefficient on the private-label share.

We were concerned that we had no good proxies for costs. By ignoring such variables, we implicitly assumed that there were no dramatic shifts in costs during this relatively brief period. It is also possible that there were shifts in demand for reasons having nothing to do with private labels. As a partial adjustment for unobserved shifts in costs and demand, we included a time trend. Including a time trend had negligible qualitative effects.

Finally, we considered the possibility that the share of private-label goods is endogenous. We hypothesize that the share of private-label goods has grown as consumers' opinions

about the acceptability or quality of them has increased over time (see the Kohn and Shavell, 1974, "try it you'll like it" model). If this shift in consumer attitudes is exogenous or at least predetermined, then we are justified in treating the share of private-label goods as exogenous in our regressions.

However, suppose that other factors also affect the private-label share as well. Firms may introduce private-label items when the price of name-brand goods is unusually high. Further, the price of name-brand goods and the likelihood of entry of private-label goods could depend on the existence of an unfilled niche in the product space. Here, we should use an instrumental variables approach.

To derive instruments, we hypothesized that the same factors that cause the private label share to grow in one food category affect other food categories. Thus, we used the growth of the share of private-label goods in other markets as instruments in each given market. We divided the 32 industries into seven groups: canned goods, frozen goods, sweets, condiments, dairy, Italian, and other. We took the average of the share of private-label goods in each of these groups and used these as instruments (dropping the one to which the given industry belongs). The resulting instrumental variables estimates were very close to the original estimates. Using a Hausman test, we rejected exogeneity in only 3 of the 32 industries, and even in those industries the efficient and consistent point estimates were close.[36] Consequently, we report only our generalized least squares estimates.

[36] We also tried regressing price on a one period lag of the private-label share — so that share was "predetermined" — which had (not surprising) little effect. We only mention this exercise in passing as it probably doesn't pass the straight-face test.

Conclusions

Using statements by industry experts, we collected a set of stylized facts about the invasion of private-label products into supermarkets. We then used supermarket scanner data to test the validity of these beliefs.

The first set of beliefs are that private-label products continue to expand their share of food industries (true in only some food categories), that these products have lower prices than name-brands (almost always true), and that this entry particularly harms second-tier national brands (false in most categories). We find that the quantity share of private-label (and generic goods) is increasing in fewer than half of food and beverages categories, but this share is growing at double digit annual rates in one in four categories. In all but one category, private-label prices are lower than those of name-brand goods. Increased private-label share tends to relatively harm the leading name-brand firm and leads to slightly more equal name-brand item and firm shares overall.

The second set of beliefs concerns the response of name-brand firms to the increased competition from the private labels. The conventional industry wisdom is that name-brand firms defended their brands against the private-label invasion by increasingly differentiating their products, conducting sales, engaging in other promotional activities, and lowering their prices. Our empirical evidence largely repudiates all these beliefs. When the private-label share increases, the number of name-brand items per firm — a measure of differentiation — is unchanged of falls. Name-brand firms react to a rise in private-label share by holding fewer sales and decreasing the share of items with nonprice promotions. Increases in the share of private-label goods leads to a rise in the price of name-brand goods. Because an

increase in private-label share leads to no effect or a decrease in the price of private-label goods, the overall prices usually (but not always) are unchanged or fall.

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Table 1: Average Quantity Shares and Annual Exponential Growth Rate

	Average Quantity Share				
	Branded	*Private Label*	*Generic*	*Private Label & Generic*	*Annual Growth Rate of Private Label & Generic (%)*
baked beans	90.5	9.4	.1	9.5	-.9
butter	50.9	49.0	.1	49.1	-.6
canned ham	97.0	3.0	0.	3.0	23.3**
canned juices	80.2	19.7	0.	19.8	11.4**
cottage cheese	56.0	43.8	.1	44.0	.5
crackers	83.1	16.8	.1	16.9	-1.8
desserts	96.7	3.3	0.	3.3	14.6**
English muffins	68.5	31.4	.1	31.5	-3.4**
frosting	93.3	6.7	0.	6.7	1.5
frozen baked goods	86.0	13.9	.1	14.0	6.0**
frozen breakfast food	92.6	7.4	0.	7.4	16.7**
frozen fruit	35.5	64.5	0.	64.5	5.4**
frozen poultry	83.9	16.1	0.	16.1	28.1**
gelatin mixes	93.8	6.2	0.	6.2	-2.4
hot cereal	73.2	26.2	.6	26.8	6.4**
ice cream	66.0	34.0	0.	34.0	-4.3**
instant potatoes	84.9	15.1	.1	15.1	-2.3
mustard & ketchup	76.7	23.1	.2	23.3	-.1
peanut butter	76.5	23.1	.3	23.5	-1.4*
pickles and relish	99.0	1.0	0.	1.0	34.7**
pizza products	96.2	3.8	0.	3.8	22.2**
pizza, refrigerated	84.5	15.5	0.	15.5	-4.3*
popcorn/popcorn oil	69.8	30.0	.3	30.2	-2.1
rice/popcorn cakes	88.2	11.8	0.	11.8	.6
shortening and oil	70.9	28.5	.5	29.1	1.6
snack/granola bars	92.8	7.2	0.	7.2	17.0**
spaghetti/Italian sauce	95.1	4.8	.1	4.9	-.8
sugar substitutes	87.9	11.9	.2	12.1	21.3**
tea, ready to drink	96.2	3.8	0.	3.8	-.4
tomato products	67.1	32.5	.3	32.9	2.5*
vinegar	38.9	61.0	.1	61.1	1.7**
yogurt	79.8	20.2	0.	20.2	1.1

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Note: Annual exponential growth rate estimated controlling for seasonality.

Table 2: Average Levels, Annual Exponential Growth Rates, and Percentages of Real Prices

	All		*Branded*		*Private Label*		*Private-Label Price as a Percentage of*	
	Average	*Rate*	*Average*	*Rate*	*Average*	*Rate*	*Name Brands*	*All*
baked beans	.59	2.2*	.62	2.3*	.40	.4	65.2	96.0
butter	2.35	27.3**	2.60	24.8**	2.13	29.8**	81.6	90.4
canned ham	2.41	-3.9*	2.42	-3.3	2.04	-12.5**	84.6	99.4
canned juices	.53	.0	.57	1.1**	.41	-1.2**	72.2	93.7
cottage cheese	1.50	1.1**	1.63	.5	1.34	1.9**	82.3	91.8
crackers	2.43	1.6*	2.78	.7	1.26	3.1**	45.4	87.5
desserts	1.70	.7	1.70	.8	1.54	-1.8**	90.1	99.7
English muffins	1.74	2.6**	2.27	1.1**	.97	3.3**	42.7	76.5
frosting	1.43	.3	1.45	.4	1.20	-.6**	83.3	98.8
frozen baked goods	1.70	6.3**	1.80	7.0**	1.17	4.3**	65.0	94.2
frozen breakfast food	2.46	-.3	2.51	-.1	1.93	2.2**	76.9	98.1
frozen fruit	1.83	3.4**	1.98	1.5**	1.75	5.0**	88.5	92.5
frozen poultry	1.68	-4.3**	1.60	-6.7**	2.18	.6	137.0	105.2
gelatin mixes	1.95	-2.8*	1.96	-3.2**	1.82	3.4**	93.5	99.6
hot cereal	1.74	1.7**	1.98	2.9**	1.23	2.2**	62.1	87.7
ice cream	.74	5.8**	.87	3.7**	.55	7.8**	63.8	85.8
instant potatoes	2.29	-.1	2.39	-.2	1.81	-.5	75.9	95.9
mustard and ketchup	.91	.9	.98	.6	.70	1.9**	70.9	92.2
peanut butter	1.69	-.8**	1.78	-.7**	1.43	-1.3**	80.2	94.9
pickles and relish	1.59	1.6**	1.59	1.8**	1.17	-6.8**	73.8	99.7
pizza products	1.32	-1.2**	1.34	-.9**	1.01	-3.3**	76.0	99.0
pizza, refrigerated	1.89	-.8**	1.91	-1.2**	1.78	1.0	93.0	98.9
popcorn/popcorn oil	1.74	2.1**	2.36	2.3**	.86	-.3	36.7	73.8
rice/popcorn cakes	5.44	-2.4**	5.64	-3.0**	4.14	2.7**	73.4	96.4
shortening and oil	.88	-1.1**	.96	-1.4*	.73	-.1	75.7	92.1
snack/granola bars	4.21	.1	4.26	.2	3.55	1.0*	83.3	98.7
spaghetti/Italian sauce	.98	-.2	1.00	-.3	.75	.4	74.9	98.5
sugar substitutes	.36	-7.4**	.44	-1.3**	.08	-15.1**	18.2	81.6
tea, ready to drink	.41	-2.7**	.42	-2.6**	.26	-7.0**	60.8	98.1
tomato products	.60	1.0	.66	1.5	.51	.7	77.7	92.0
vinegar	.46	-1.0	.78	1.0	.33	-1.0*	42.7	59.4
yogurt	1.26	.6*	1.37	.2	.91	2.7**	66.4	92.1

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Note: CPI adjustment = 1 in the first month.

Table 3: Shares of the Largest Brand Firms and Private-Label Firms

	Average Share (%)							*Growth Rate (%)*	
	1	2	3	4	5-8	8+	*Private Label*	1	2
baked beans	39.3	25.9	13.5	5.5	5.1	1.2	9.5	2.23**	2.45*
butter	30.3	3.4	1.8	1.6	5.0	8.8	49.1	1.80	-.35
canned ham	34.1	22.8	10.5	10.1	14.4	5.2	3.0	1.74	-5.87
canned juices	19.2	17.6	11.5	4.6	10.7	16.6	19.8	-4.08**	-5.08**
cottage cheese	19.0	3.9	3.2	2.6	7.6	19.7	44.0	1.46**	12.32**
crackers	24.1	14.5	9.5	6.5	13.3	15.2	16.9	-3.37	5.99**
desserts	59.3	18.7	10.4	1.5	3.0	3.7	3.3	-.16	-18.42**
English muffins	51.3	2.0	1.6	2.2	4.8	6.6	31.5	4.06**	-45.39*
frosting	47.4	25.9	19.0	.9	.1	.0	6.7	-.84	-3.33*
frozen baked goods	45.6	10.0	5.7	6.9	10.0	7.8	14.0	-8.79**	1.35**
frozen breakfast food	40.4	16.6	6.2	2.8	11.7	14.9	7.4	-8.63**	1.91
frozen fruit	9.6	5.0	4.5	1.1	6.1	9.1	64.5	-1.46**	-.71
frozen poultry	15.3	15.8	3.4	5.5	13.8	30.0	16.1	-8.40**	-.81
gelatin mixes	18.0	17.9	32.5	4.1	19.6	1.7	6.2	-8.33**	-1.01
hot cereal	54.3	10.9	3.3	1.0	2.1	1.7	26.8	-2.00	-3.00**
ice cream	11.8	10.9	4.4	2.7	8.8	27.4	34.0	12.95**	7.77**
instant potatoes	40.2	29.5	11.5	.3	1.5	1.9	15.1	.98	.15
mustard and ketchup	35.2	15.6	7.7	8.3	5.4	4.4	23.3	.75	5.54**
peanut butter	25.6	14.8	12.5	6.1	12.0	5.6	23.5	1.17	.517.4
pickles and relish	78.2	4.7	5.8	1.9	3.1	5.3	1.0	1.62**	-36.86**
pizza products	28.9	23.4	13.9	6.6	11.4	12.0	3.8	4.11**	.77
pizza, refrigerated	51.1	8.4	5.9	2.7	6.6	9.8	15.5	4.07**	4.39**
popcorn and popcorn oil	31.2	19.0	6.2	3.5	5.0	4.9	3.2	2.45	5.43**
shortening and oil	16.2	18.0	8.3	11.8	6.3	10.2	29.1	3.24	-.42
rice and popcorn cakes	68.3	4.0	12.1	1.0	1.8	.9	11.8	-3.54**	-39.14**
snack bars/granola bars	25.6	17.5	12.0	1.8	18.7	8.2	7.2	-.43	17.96**
spaghetti/Italian sauce	36.8	21.4	15.3	7.3	11.0	3.2	4.9	2.03**	-3.87*
sugar substitutes	46.4	24.6	3.8	4.0	7.1	2.0	12.1	-3.65**	1.39
tea, ready to drink	41.5	25.8	16.2	6.9	3.5	2.4	3.8	2.62**	3.47*
tomato products	15.5	9.7	6.3	5.9	13.4	16.5	32.9	1.01	-2.96
vinegar	17.7	4.9	1.6	1.4	3.0	10.3	61.1	-1.78	.21
yogurt	30.1	23.7	10.2	1.9	6.3	7.6	2.2	-6.71**	10.24**

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Growth rates estimated controlling for seasonality.

Table 4: Measures of Equality of Name-Brand Shares

	Average		*Annual Growth Rate (%)*	
	Item Gini	*Firm Gini*	*Item Gini*	*Firm Gini*
baked beans	.83	.92	-.30	-.02
butter	.90	.93	.44**	.08
canned ham	.78	.81	-1.42**	-1.72**
canned juices	.90	.94	-.30**	.08*
cottage cheese	.77	.85	.21	-.09
crackers	.92	.97	-.04	-.03
desserts	.93	.96	.07	-.17
English muffins	.91	.94	.66**	.09
frosting	.64	.82	-.31	-.09
frozen baked goods	.86	.93	-.40**	-.34**
frozen breakfast food	.82	.90	-1.51**	-1.06**
frozen fruit	.76	.81	-1.73**	-1.53**
frozen poultry	.83	.90	.76**	.81**
gelatin mixes	.82	.95	-.86**	.00
hot cereal	.92	.97	.05	.00
ice cream	.88	.92	.81**	.54**
instant potatoes	.84	.95	-.15	-.04
mustard and ketchup	.96	.97	.12	.07
peanut butter	.90	.95	-.56**	-.33**
pickles and relish	.93	.97	-.40**	-.04
pizza products	.86	.90	.07	-.10
pizza, refrigerated	.85	.93	1.72**	.79**
popcorn and popcorn oil	.89	.97	-1.61**	-.20**
rice and popcorn cakes	.89	.94	-.71**	.04
shortening and oil	.91	.95	.03	.10
snack bars/granola bars	.90	.93	-1.12**	-.09
spaghetti/Italian sauce	.90	.98	-.08	-.03
sugar substitutes	.88	.92	-1.39**	-.31**
tea, ready to drink	.91	.96	-.78**	-.28**
tomato products	.87	.93	-.24**	.21**
vinegar	.88	.91	-.33**	-.09
yogurt	.87	.94	.27**	.07

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Growth rates estimated controlling for seasonality.

Table 5: Elasticity of the Share of Individual Name-Brand Firms with Respect to the Share of Private-Label Items

	1	*2*	*3*	*4*	*5-8*	*9+*
baked beans	-0.07*	-0.26**	-0.26	0.08	0.89**	0.67**
butter	-1.28**	-2.81**	0.22	-4.12**	0.44	0.64**
canned ham	0.00	-0.05	0.14	-0.17	-0.04	-0.30
canned juices	-0.36**	0.68**	-0.55	-0.14	0.51	0.36**
cottage cheese	-0.19	0.21	0.38	-2.15*	-0.57	-0.67**
crackers	-0.91**	-1.04**	1.37**	1.60**	0.15	-0.38**
desserts	-0.18**	-0.26*	1.05**	0.70**	0.58**	0.84**
English muffins	-0.77**	0.35	0.66	0.56	0.58*	-0.44
frosting	-0.23*	0.28*	-0.11	0.68**	0.77**	0.44
frozen baked goods	-0.26	0.10	-1.07	0.10	-0.06	-0.14
frozen breakfast food	-0.09*	0.09	-0.52**	-0.84	-0.14	0.27
frozen fruit	0.03	0.02	-4.33**	-17.39**	-2.47**	-0.63
frozen poultry	-0.26**	0.07	0.56**	-0.23	-0.36**	-0.38**
gelatin mixes	0.97**	1.11**	-0.94**	-8.79*	-0.11	0.96**
hot cereal	-0.54**	0.26**	0.23	1.16**	0.25*	0.56**
ice cream	-2.14**	-1.60**	-1.39**	0.31	-0.53*	0.30
instant potatoes	-0.77**	0.08	0.92**	-0.77	0.99**	0.68
mustard and ketchup	-0.76**	0.09	0.04	0.10	0.24	0.97**
peanut butter	0.53**	-1.30**	-0.54*	0.35	-0.79**	0.05
pickles and relish	0.03**	0.22	0.17**	-0.15	0.01	0.07
pizza products	0.18**	-0.04	-0.28**	0.07	-0.18**	0.07
pizza, refrigerated	-0.33**	0.05	-0.20	0.72	-0.11	0.06
popcorn and popcorn oil	-0.89**	-0.63*	1.02**	1.31**	0.25	0.58*
rice and popcorn cakes	-0.28**	0.74**	-0.59	0.52**	1.23**	1.30**
shortening and oil	-1.61**	0.41**	-1.97**	0.42	0.39	0.39**
snack bars/granola bars	0.12	-0.88**	0.33**	-0.82**	0.16	0.17
spaghetti/Italian sauce	0.01	-0.11	0.11	-0.29	-0.27	0.19
sugar substitutes	-0.12**	-0.10	-0.38**	-0.38	-0.16	-0.07
tea, ready to drink	-0.04	-0.28*	-0.03	0.58**	0.89**	0.29
tomato products	-0.21	-1.17*	-0.40	-1.02**	-0.56*	-0.04
vinegar	-0.39	-1.50*	-1.10	-2.19*	-5.93**	-1.58**
yogurt	-0.65**	-0.06	-0.13	0.76*	0.03	0.25*

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
* Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies. Autocorrelation correction imposed.

Table 6: Elasticities of Gini Indexes with Respect to the Private-Label Share

	Gini Items	*Gini Firms*
baked beans	-0.09**	-0.02**
butter	-0.16**	-0.09**
canned ham	-0.01	-0.01
canned juices	-0.02**	0.00
cottage cheese	-0.03	-0.10*
crackers	0.00	-0.01
desserts	-0.03**	-0.02**
English muffins	-0.05	-0.03**
frosting	-0.04	-0.02
frozen baked goods	-0.03**	-0.01
frozen breakfast food	-0.03	-0.01
frozen fruit	-0.37**	-0.27**
frozen poultry	0.01*	0.02**
gelatin mixes	0.01	0.00
hot cereal	-0.02**	-0.01**
ice cream	-0.12**	-0.07**
instant potatoes	-0.10**	-0.02**
mustard and ketchup	-0.04**	-0.02**
peanut butter	-0.02	0.00
pickles and relish	-0.01**	-0.01**
pizza products	0.00	0.00
pizza, refrigerated	0.00	-0.01
popcorn and popcorn oil	-0.06**	-0.01*
rice and popcorn cakes	-0.03**	-0.01*
shortening and oil	-0.05**	-0.02**
snack bars/granola bars	0.00	-0.01*
spaghetti/Italian sauce	-0.01	0.00
sugar substitutes	-0.06**	-0.01**
tea, ready to drink	-0.03**	-0.01*
tomato products	0.00	0.00
vinegar	0.03	0.01
yogurt	-0.01	-0.02**

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
** Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies. Autocorrelation correction imposed.

Table 7: Numbers of Branded Items, Brands, and Name-brand Firms

	Average Number of (Brand Name)			*Annual Growth Rate (%)*			
	Items	*Brands*	*Firms*	*Items*	*Brands*	*Firms*	*Quantity*
baked beans	233.5	61.2	42.1	-.64	-4.57**	-2.30**	-1.15
butter	292.9	146.5	114.0	4.54**	.25	1.78	-9.39*
canned ham	86.3	41.3	29.9	-12.91**	-13.71**	-1.85**	-9.81
canned juices	767.2	230.2	174.4	-1.11	2.17**	1.98**	-6.46**
cottage cheese	902.1	206.2	127.2	-.35	-2.39**	-2.08**	4.15**
crackers	2,355.7	677.8	449.6	-1.37**	-2.64**	-2.62**	-.66
desserts	646.0	101.3	79.6	2.68**	-1.02*	-1.62**	2.16
English muffins	344.1	111.6	65.9	-2.95**	-4.19**	-2.76**	-3.04**
frosting	95.6	26.0	13.3	-6.11**	-7.18**	1.51	-5.44
frozen baked goods	306.8	113.8	106.3	1.53**	-4.60**	-6.11**	-6.84**
frozen breakfast food	332.8	105.3	65.7	2.28**	-.59	3.49	4.01**
frozen fruit	313.2	63.0	52.0	-3.13**	-3.83**	-2.03	.67
frozen poultry	1,061.6	215.2	136.7	2.03**	5.22**	6.25**	5.63**
gelatin mixes	622.1	128.4	98.3	1.62**	-1.77**	-.21	.54
hot cereal	365.5	107.3	83.6	-1.72**	-.19	-.32	-1.84
ice cream	7,293.9	625.8	341.8	-4.17**	-5.69**	-5.30**	-.25
instant potatoes	229.3	80.5	60.5	-1.73**	2.92**	-.15	1.44
mustard and ketchup	963.2	375.1	305.1	-2.70**	-2.80**	-1.50**	2.48*
peanut butter	337.0	151.3	128.3	-3.88**	-4.18**	-4.76**	-2.20**
pickles and relish	274.1	146.1	131.7	-8.45**	-4.61**	-5.93**	-1.33
pizza products	127.2	81.1	72.5	.04	1.70*	.54	-3.97**
pizza, refrigerated	407.5	124.5	99.3	-7.45**	-5.09**	-1.41**	-2.43*
popcorn/popcorn oil	485.6	152.7	118.6	-10.87**	-8.36**	-11.81**	2.46*
rice & popcorn cakes	270.7	42.1	33.7	-1.03	.66	1.47	-5.00
shortening and oil	1,412.4	427.8	344.8	1.86**	1.51*	2.94**	-2.06*
snack/granola bars	713.5	169.7	105.6	5.51**	4.53**	2.83**	7.57**
spaghetti/Italian sauce	1,155.3	321.3	264.0	3.19**	3.61**	4.35**	-.54
sugar substitutes	123.2	51.5	32.5	-6.39**	-4.17**	-4.25**	.53
tea, ready to drink	556.6	136.1	101.2	-7.90**	-4.74**	-8.33**	13.15**
tomato products	855.6	256.3	188.3	-.59**	-.38	1.68**	-4.82**
vinegar	966.7	312.9	245.2	-2.21**	-.22	-.67*	-2.10
yogurt	1,882.5	189.7	101.4	-.22	-6.85**	-1.75**	4.15*

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Growth rates estimated controlling for seasonality. All columns refer to only name-brand items, brands, and firms except the last one, which refers to quantity produced by all firms.

Table 8: Averages and Rates of Growth of Brand-Name Items Per Firm and Per Quantity

	Average			*Annual Growth Rate (%)*	
	Items / Firm	*Items / Quantity*	*Brands / Firm*	*Items / Firm*	*Items / Quantity*
baked beans	5.57	.51	1.45	1.65*	.50
butter	2.58	.97	1.28	2.76**	13.93**
canned ham	2.88	3.25	1.38	-2.06*	-3.09
canned juices	4.39	.79	1.32	-3.09**	5.35**
cottage cheese	7.10	2.50	1.62	1.73**	-4.50**
crackers	5.24	2.83	1.51	1.26**	-.71
desserts	8.13	3.17	1.27	4.31**	.53
English muffins	5.22	2.23	1.69	-.19	.09
frosting	7.17	.78	1.95	-7.62**	-.67
frozen baked goods	2.90	1.99	1.07	7.65**	8.37**
frozen breakfast food	5.08	1.31	1.60	-1.21	-1.73
frozen fruit	6.02	4.72	1.21	-1.11	-3.80
frozen poultry	7.76	2.15	1.57	-4.22**	-3.60
gelatin mixes	6.34	3.01	1.31	1.83**	1.08
hot cereal	4.36	1.46	1.28	-1.40*	.12
ice cream	21.36	2.11	1.83	1.12**	-3.93**
instant potatoes	3.79	2.65	1.33	-1.58**	-3.17**
mustard and ketchup	3.16	1.79	1.23	-1.20**	-5.19**
peanut butter	2.62	1.01	1.18	.88	-1.68
pickles and relish	2.08	3.86	1.11	-2.52**	-7.12**
pizza products	1.76	2.52	1.12	-.50	4.01**
pizza, refrigerated	4.09	5.69	1.25	-6.05**	-5.02**
popcorn/popcorn oil	4.11	2.46	1.29	.93	-13.33**
rice and popcorn cakes	8.04	11.81	1.25	-2.50**	3.97
shortening and oil	4.09	1.33	1.24	-1.07**	3.92**
snack/granola bars	6.77	5.01	1.61	2.68**	-2.06
spaghetti/Italian sauce	4.38	1.15	1.22	-1.15**	3.73**
sugar substitutes	3.78	.43	1.59	-2.14**	-6.92**
tea, ready to drink	5.50	.95	1.35	.43	-21.04**
tomato products	4.54	.87	1.36	-2.26**	4.23**
vinegar	3.94	3.97	1.28	-1.54**	-.11
yogurt	18.56	1.89	1.87	1.53	-4.37*

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Quantity of all goods is in hundred thousand units. Growth rates estimated controlling for seasonality.

Table 9: Elasticities of Number of Name-Brand Items, Number of Firms, and Items per Firm with Respect to the Private-Label Share

	Number of Items	*Number of Firms*	*Items / Firms*
baked beans	-0.07*	-0.02	-0.03
butter	-0.19**	-0.12	-0.06
canned ham	0.00	0.02	-0.01
canned juices	-0.09	0.02	-0.23**
cottage cheese	-0.22**	-0.28**	0.08
crackers	-0.03	0.02	-0.05
desserts	0.02	-0.01	0.00
English muffins	0.14	0.19	-0.08
frosting	-0.06	0.00	-0.07
frozen baked goods	-0.04	-0.01	-0.06
frozen breakfast food	0.12**	0.12**	0.02
frozen fruit	-0.27	-0.41	0.25
frozen poultry	0.03*	0.14**	-0.13**
gelatin mixes	0.02	-0.01	-0.03
hot cereal	-0.06*	0.04	-0.11**
ice cream	-0.01	0.07	-0.16**
instant potatoes	-0.01	-0.08	0.08
mustard and ketchup	0.03	0.05*	-0.02
peanut butter	0.09	0.14	-0.05
pickles and relish	-0.01	0.00	-0.03*
pizza products	0.03	0.04	-0.01
pizza, refrigerated	0.10	0.15**	0.03
popcorn and popcorn oil	0.10	0.27*	-0.10
rice and popcorn cakes	-0.03	0.15**	-0.19**
shortening and oil	-0.02	0.07	-0.10
snack bars/granola bars	0.07	0.11**	0.12**
spaghetti/Italian sauce	0.02	0.03	-0.03
sugar substitutes	-0.27**	-0.18**	-0.10**
tea, ready to drink	-0.13*	-0.06	0.03
tomato products	0.00	-0.02	0.06
vinegar	-0.17	-0.32**	-0.02
yogurt	-0.02	-0.08	0.02

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
** Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies. Autocorrelation correction imposed.

Table 10: Births and Deaths

	Item Births	*Item Deaths*	*Correlation Between Births and Deaths*		
	Firm	*Firm*	*Items*	*Brands*	*Firms*
baked beans	.14	.14	-.16	-.10	-.05
butter	.07	.06	.05	.10	.00
canned ham	.06	.09	.29	.03	.05
canned juices	.15	.15	.13	-.28	-.24
cottage cheese	.10	.10	-.13	-.08	.46
crackers	.18	.18	.04	.07	-.19
desserts	.20	.18	.17	.01	.12
English muffins	.09	.11	-.10	.31	-.23
frosting	.30	.37	.49	-.17	.02
frozen baked goods	.08	.08	.06	.13	.09
frozen breakfast food	.21	.20	-.19	-.16	-.36
frozen fruit	.14	.16	-.06	-.36	-.32
frozen poultry	.28	.27	.05	-.10	.03
gelatin mixes	.22	.21	.02	-.13	-.47
hot cereal	.12	.13	-.24	-.18	-.21
ice cream	.66	.73	-.07	-.25	-.16
instant potatoes	.15	.15	.01	-.22	-.05
mustard and ketchup	.11	.12	-.18	-.05	-.06
peanut butter	.11	.12	-.22	-.19	-.21
pickles and relish	.06	.07	-.15	-.15	-.30
pizza products	.04	.04	-.11	-.30	-.30
pizza, refrigerated	.13	.15	.00	.08	.08
popcorn/popcorn oil	.17	.20	.16	-.03	-.27
rice and popcorn cakes	.27	.29	-.09	-.42	-.40
shortening and oil	.13	.13	-.07	-.09	-.09
snack/granola bars	.33	.31	-.11	.00	-.02
spaghetti/Italian sauce	.16	.15	-.11	-.34	-.41
sugar substitutes	.21	.23	-.24	-.12	.16
tea, ready to drink	.31	.36	-.06	-.15	-.22
tomato products	.13	.13	-.01	.41	.21
vinegar	.13	.14	.10	.32	.39
yogurt	.42	.42	.00	-.08	-.22

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Quantity of all goods is in hundred thousand units. Growth rates estimated controlling for seasonality.

Table 11: Births and Deaths Relative to Other Branded Items

	Shares of All Branded Items		*Relative Prices*	
	Births	*Deaths*	*Births* / *Continuing*	*Deaths* / *Continuing*
baked beans	.52	.47	1.17	1.17
butter	.08	.07	.77	.73
canned ham	.28	.15	1.06	1.04
canned juices	.19	.15	1.04	1.04
cottage cheese	.21	.15	.89	.90
crackers	.19	.10	.96	.90
desserts	.07	.02	.90	.98
English muffins	.37	.24	.83	.77
frosting	2.75	2.83	1.14	1.14
frozen baked goods	.54	.61	1.24	1.19
frozen breakfast food	.12	.05	.99	1.03
frozen fruit	.26	.28	.83	.89
frozen poultry	.28	.11	.92	.89
gelatin mixes	.80	.59	.90	.90
hot cereal	.04	.04	1.12	.67
ice cream	.34	.23	.89	.88
instant potatoes	.10	.06	1.16	.93
mustard and ketchup	.01	.01	1.98	1.52
peanut butter	.11	.12	1.07	.82
pickles and relish	.01	.01	1.42	1.34
pizza products	.77	.75	1.38	.92
pizza, refrigerated	.19	.07	1.25	1.13
popcorn and popcorn oil	.25	.19	.68	.69
rice and popcorn cakes	.28	.21	.97	.88
shortening and oil	.08	.04	1.55	1.29
snack bars/granola bars	.32	.23	1.05	.98
spaghetti/Italian sauce	.41	.46	1.15	1.11
sugar substitutes	.47	.37	1.14	1.10
tea, ready to drink	.32	.35	1.19	1.20
tomato products	.24	.10	.82	.88
vinegar	.07	.05	1.50	1.12
yogurt	.21	.17	.88	.81

Table 12: Average Share and Growth Rates of Items with Promotions

	Share Price Promotions (%)		*Share Nonprice Promotions (%)*	
	Average	*Growth Rate*	*Average*	*Growth Rate*
baked beans	8.2	1.06	23.7	.91
butter	18.0	-29.29*	22.6	-18.85*
canned ham	10.8	.76	34.9	9.03
canned juices	9.7	-8.49**	19.5	-9.72**
cottage cheese	10.5	-5.94	14.3	.44
crackers	13.2	-6.31**	36.5	2.57*
desserts	12.5	3.64	16.5	7.15
English muffins	5.7	5.38	15.5	5.74
frosting	15.0	-12.24**	17.9	-4.82
frozen baked goods	10.9	-4.34	20.5	-2.77
frozen breakfast food	9.8	-1.88	18.8	4.83**
frozen fruit	6.3	-2.38	7.3	-.74
frozen poultry	13.4	5.61	17.2	-8.53**
gelatin mixes	11.8	-2.51	21.3	.68
hot cereal	5.3	-10.44	11.5	-14.70
ice cream	12.7	-7.22**	35.5	4.81**
instant potatoes	7.6	-5.57	17.9	-6.00
mustard and ketchup	8.5	-4.07**	27.3	7.41
peanut butter	9.2	-3.22	18.8	-1.93
pickles and relish	12.0	-24.40**	18.9	-15.19*
pizza products	6.3	-1.41	7.5	17.22**
pizza, refrigerated	6.0	15.33**	14.1	5.87**
popcorn and popcorn oil	13.7	4.11	16.3	4.02
rice and popcorn cakes	9.3	16.14**	9.8	-10.85
shortening and oil	10.1	-8.35**	26.9	2.60
snack bars/granola bars	8.9	10.85*	16.4	.77
spaghetti/Italian sauce	14.7	-2.59	24.5	4.00
sugar substitutes	6.3	-13.37*	3.9	-47.30**
tea, ready to drink	16.3	-1.58	33.8	-4.01**
tomato products	10.9	-3.24	24.8	-6.28
vinegar	6.5	8.86*	3.9	-10.31
yogurt	12.6	-5.82*	18.9	2.71

* Reject the hypothesis that the growth rate is zero at .10 confidence level.
** Reject the hypothesis that the growth rate is zero at .05 confidence level.
Notes: Growth rates estimated controlling for seasonality.

Table 13: Elasticity of the Share of Promotions with Respect to the Private-Label Share

	Price Reductions	*Nonprice Promotions*
baked beans	-0.89**	-3.33**
butter	4.17*	-10.94**
canned ham	0.14	0.19
canned juices	-0.58	-0.84**
cottage cheese	-0.45	1.73
crackers	-0.17	-0.48**
desserts	-0.49*	-0.32
English muffins	0.78	-1.51**
frosting	-2.17**	-2.93**
frozen baked goods	-0.82**	-1.70**
frozen breakfast food	-0.25**	-0.02
frozen fruit	-1.13	-0.97
frozen poultry	-0.11	-0.21*
gelatin mixes	-0.29	-1.70**
hot cereal	-1.87**	-4.90**
ice cream	-1.09**	-1.17**
instant potatoes	-0.99*	-3.89**
mustard and ketchup	0.22	-4.48**
peanut butter	-0.14	-3.10**
pickles and relish	-0.78**	-0.53**
pizza products	-0.08	0.76**
pizza, refrigerated	-1.02**	-0.03
popcorn and popcorn oil	-1.66**	-3.92**
rice and popcorn cakes	-1.32*	-4.08**
shortening and oil	-0.27	-2.09**
snack bars/granola bars	-0.17	-3.02
spaghetti/Italian sauce	-0.38*	-0.96**
sugar substitutes	-0.40	-2.29**
tea, ready to drink	-0.37**	-0.45**
tomato products	-0.86*	-1.15
vinegar	-0.12	0.00
yogurt	-2.90**	-4.05**

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
** Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies. Autocorrelation correction imposed.

Table 14: Elasticity of Name-Brand Firm's Share with Respect to Private-Label Share

	Eight Largest Brand Firms and Other Brand Firms								
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9+*
baked beans	.22**	.42**	.54**	.28*	.25**	.19**	.09	.10**	.31**
butter	.29	.53	-.82	.38	-.13	-.84	1.15	-.41	-.28
canned ham	-.03	-.07	-.04	.02	-.01	.02**	-.02	.00	.04
canned juices	.09**	.17**	.37**	.37**	.02	-.57	.07	-.18	-.05
cottage cheese	-.14	-.28	-.53	-.09	.47*	-.11	-.13	.03	.45**
crackers	.19**	.26**	-.34	-.17	.04	-.03	.14*	.03	-.08
desserts	.07**	.09**	.03	-.03	.05	.09*	.04	.01	.03
English muffins	-.59	-.10	.14	-.03	-.24	-.55	-.01	-.55	.55**
frosting	.19**	.10**	.04	.05	-.13	.01	.47*	-.01	-.08
frozen baked goods	.17**	.00	.49**	.17**	-.05	.32**	.23**	.28	-.11
frozen breakfast food	.05**	.06**	.08**	.26**	.00	.07	.12**	.08**	-.03
frozen fruit	.23	.07	.10	.83**	.66**	-.12	.18	.57**	.83**
frozen poultry	-.12	.03	-.07	.14	.10	.18	.12	.05	.25*
gelatin mixes	-.16	-.22	.13**	.11	.20	-.01	.17*	-.10	.63**
hot cereal	.19**	-.13	.06**	-.14	.05*	-.01	-.04	.17*	-.06
ice cream	.09	.46**	.57*	.10	-.13	-.43	.25	.52**	.23**
instant potatoes	.13	.01	.02	-.15	-.02	.02	.11	.21*	-.02
mustard & ketchup	.31**	.22**	.17**	.20**	.06**	.28**	-.02	.06	.29**
peanut butter	-.01	.29*	.21*	.01	.24*	.17	-.10	-.02	.64**
pickles and relish	.09**	.08	.09**	.05	.06**	.02	.07**	.12**	.09**
pizza products	.05**	.07	.02	.01	.01	.15**	.06**	.09**	.05
pizza, refrigerated	.02	-.02	-.01	-.16	-.19	.03	-.03	-.03	-.03
popcorn/popcorn oil	.25**	.01	.07*	.02	.13	-.07	-.09	.00	.14
rice/popcorn cakes	.20**	-.02	.07	.01	-.95	-.02	-.01	.04*	-.18
shortening and oil	.51**	.02	-.08	.17	-.54	.08	-.17	.03	.19
snack/granola bars	.02	.16**	-.01	.01	.12**	.09**	.13**	.15	.06
spaghetti/Italian sauce	.11*	.02	.06	.06	.02	.01	.01	.30	.08
sugar substitutes	.04**	-.02	.07*	.33*	.12**	.38**	.05*	.03*	.12*
tea, ready to drink	.21**	.20**	.45**	.02	.27**	.19	.15	.00	.18
tomato products	.18	.55	.08	.21	.10**	.23	.50**	.09	.06
vinegar	-.24	-.06	.17	.06	-.83	.08	.42**	-.04	-.06
yogurt	.37**	.15**	-.01	.25*	.11	-.07	.38	.04	.00

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
** Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies and a constant. First-order autocorrelation correction imposed.

Table 15: Elasticities of Price with Respect to the Share of Private-Label Goods

	All	*Branded*	*Private Label*
baked beans	-.03	.04	-.36**
butter	-.25	.16	-.47
canned ham	-.10**	-.08*	-.39**
canned juices	.02	.13**	-.14**
cottage cheese	-.46**	-.02	-.84**
crackers	-.27**	-.12**	-.27**
desserts	.06*	.06*	-.04
English muffins	-.54**	-.10	-.67**
frosting	.09**	.11**	-.02
frozen baked goods	.11	.22**	-.10
frozen breakfast food	-.02*	-.01	.11**
frozen fruit	.48**	.24	.21
frozen poultry	.34**	.35**	-.02
gelatin mixes	.26	.30*	-.06
hot cereal	-.08**	.07*	.01
ice cream	-.02	.18**	.06
instant potatoes	-.09**	-.05	.00
mustard and ketchup	.15**	.30**	-.01
peanut butter	-.08	.01	-.15*
pickles and relish	.05**	.06**	-.11*
pizza products	-.06**	-.04**	-.19**
pizza, refrigerated	.00	-.02	.21
popcorn and popcorn oil	-.43**	-.13**	-.09
rice and popcorn cakes	.02	.09*	-.15**
shortening and oil	.12*	.31**	-.07*
snack bars/granola bars	.00	.01	.04**
spaghetti/Italian sauce	.11**	.14**	-.15**
sugar substitutes	-.35**	-.06**	-.74**
tea, ready to drink	.30**	.32**	.07
tomato products	.10	.43**	-.20**
vinegar	-.63**	.31	-.30*
yogurt	.07	.19**	-.05

* Reject the hypothesis that the elasticity (coefficient) is zero at .10 confidence level.
** Reject the hypothesis that the elasticity (coefficient) is zero at .05 confidence level.
Notes: Not reported are three quarterly dummies. First-order autocorrelation correction imposed.

Figure 1
Pricing in a Spatial Model